

REMARKS

This Amendment is in response to the Office Action mailed June 4, 2007 in the above-identified application. Claims 18-25 and 27 have been cancelled without prejudice. Based on the foregoing amendments and the following comments, reconsideration and allowance of the application are respectfully requested.

Claims 34-36 are rejected under 35 U.S.C. § 103(a) as unpatentable over Liebert et al. (U.S. Pat. No. 6,020,592) in view of Hirata (Japanese Pat. Pub. 57-023227) and Setoyama et al. (U.S. Pat. No. 6,196,155). Claim 37 is rejected under 35 U.S.C. § 103(a) as unpatentable over Liebert et al. in view of Hirata and Setoyama et al. further in view of Shan et al. (U.S. Pat. No. 6,022,446). Claim 38 is rejected under 35 U.S.C. § 103(a) as unpatentable over Liebert et al. in view of Hirata and Setoyama et al., and further in view of Goeckner et al. (U.S. Pat. No. 6,182,604) and Suzuki et al. (U.S. Pat. No. 5,433,787). Applicant respectfully traverses the rejections.

Applicant respectfully contends that claim 34 is supported by the specification. Applicant's specification includes that "An example of a plasma doping system suitable for implementation of the present invention is shown schematically in FIG. 1." Para. 0027. Referring to FIG. 1, "anode 24 is positioned within chamber 10 in spaced relation to platen 14. Anode 24 may be movable in a direction, indicated by arrow 26, perpendicular to platen 14." Para. 0028. FIG. 1 further includes this arrow 26. "Magnetic elements 160, 162, 164, etc. are mounted on a surface of anode 150 opposite a plasma discharge region 152." Para. 0039. "Anode 150 may correspond to anode 24 shown in FIG. 1 and described above." Para. 0039, emphasis added. Therefore, claim 34 is supported in the specification.

Examiner argues that "Liebert et al. discloses a plasma doping apparatus comprising: a plasma doping chamber 10; a platen 14 located in the plasma doping chamber for supporting a workpiece 20 (col. 4, lines 32-36); an anode 24 spaced apart from the platen in the plasma doping chamber (col. 4, lines 44-46); a process gas source 36 coupled to the plasma doping chamber, wherein a plasma containing ion of the process gas is produced in a plasma discharge region between the anode and the platen (col. 5, lines 4-8); a pulse source 30 for applying pulses between the platen and the anode for accelerating ions from the plasma into the workpiece (col. 4, lines 50-57, col. 5, lines 22-33)." Examiner admitted Liebert et al. failed to teach an

adjustable anode. Examiner argues that “Hirata teaches a plasma processing apparatus wherein an adjustable anode 9, 10, 11 is configured to be vertically movable 15, 16, 17 within the plasma chamber in order to obtain an uniform processing rate.” Examiner further argues that Setoyama teaches that a plurality of magnetic elements “are disposed on the anode 9 and the anode 9 and magnets 20a are vertically movable in order to change the processing rate.” Examiner claims that “it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the anode of Liebert et al. to be movable and have a first plurality of magnets disposed on as taught by Hirata or Setoyama et al. in order to achieve an uniform processing rate or change the processing rate.”

Examiner also admits that Liebert et al. failed to teach a first plurality of magnetic elements having alternate polarities. Examiner argues that Setoyama et al. teach “a plasma processing apparatus having magnetic elements 20b with alternating polarities facing the plasma discharge region (col. 5, lines 1-6) in order to increase the processing rate (col. 6, lines 18-21).”

To establish a prima facie case of obviousness, all the claim limitations must be taught or suggested by the prior art. MPEP 2143.03. Furthermore, all words in a claim must be considered when judging the patentability of a claim against the prior art. MPEP 2143.03. Applicant respectfully contends that neither Hirata nor Setoyama establish all the limitations of Applicant’s claim 34. Applicant, therefore, respectfully submits that Examiner has not established a prima facie case of obviousness.

Applicant’s claim 34 does not require magnetic elements with alternate polarities. This limitation is found in dependent claim 38. Nor does Applicant’s claim 34 require changing the processing rate as Examiner asserts, but rather claim 34 requires “a first plurality of magnetic elements disposed on said adjustable anode and being movable within said plasma doping chamber to control a radial density distribution of the plasma and thereby the dose uniformity of the ions implanted into the workpiece.” Emphasis added.

Applicant respectfully submits that all limitations must be included in reading a claim. All words in a claim must be considered when judging patentability of a claim. *In re Wilson*, 424 F.2d 1382 (CCPA 1970); MPEP 2143.03. “There is nothing inherently wrong with defining some part of an invention in functional terms.” MPEP 2173.05(g). “A functional limitation must be evaluated and considered, just like any other limitation of the claim, for what it fairly

conveys to a person of ordinary skill in the pertinent art in the context in which it is used.” MPEP 2173.05(g). These sorts of limitations may be allowed when they, for example, “serve to precisely define present structural attributes of interrelated component parts of the claimed assembly.” MPEP 2173.05(g); *see In re Venezia*, 530 F.2d 956, 189 USPQ 149 (CCPA 1976). Here, the limitations of claim 34 define the configuration of the magnetic elements to control a radial density distribution of the plasma and thereby the dose uniformity of the ions implanted into the workpiece. This limitation cannot be ignored and must be given weight in determining patentability. *In re Attwood*, 354 F.2d 365 (CCPA 1966) (“We have here a combination claim and the limitations ignored by the board as use limitations we think are functional expressions which must be given weight.”).

The device in Hirata can “unify etching speed of a plasma etching device” and “density of reaction gas in the plasma etching device are compensated by regulating the distances between the sample electrode and the divided facing electrodes.” Abstract. This does not teach the requirements of Applicant’s claim 34 that the magnetic elements “control a radial density distribution of the plasma and thereby the dose uniformity of the ions implanted into the workpiece.” Hirata manipulates density of the reaction gas through changing the distances between the sample electrode and facing electrodes. Applicant claims controlling radial density distribution through “a first plurality of magnetic elements disposed on said adjustable anode.” Hirata fails to teach a plurality of magnetic elements disposed on an adjustable anode as required by Applicant’s claim 34.

Setoyama likewise fails to teach magnetic elements configured to control this radial density distribution. Instead, “ions in the plasma only slightly enter the cusped magnetic field which is used to efficiently confine the plasma for film formation and to easily maintain the density of the plasma.” Col. 6, lines 1-4, emphasis added. The magnetic fields are also used to increase the processing rate. Col. 6, lines 18-21.

Specifically, the permanent magnets on the roof-plate of Setoyama “generate the cusped magnetic field used for cleaning with the plasma.” Col. 6, lines 22-24. “[C]oncentric plasma rings are formed in the chamber 2, and the deposits near cusp lines – each line being a string of cusp points 31 – are only slightly etched by the plasma.” Col. 6, lines 32-35, emphasis added. Cusp magnetic fields may be reduced (col. 6, lines 37-38), lifted or lowered (col. 6, lines 45-46),

and etching speed can be smoothed (col. 6, line 47). Setoyama fails, however, to teach magnetic elements that “control a radial density distribution of the plasma and thereby the dose uniformity of the ions implanted into the workpiece.” Setoyama merely increases processing rate (col. 6, lines 18-21), but does not control radial density distribution or dose uniformity. In fact, Setoyama teaches forming rings of plasma (col. 6, lines 32-35), rather than Applicant’s controlling “dose uniformity of the ions implanted into the workpiece.”

Finally, Setoyama teaches that “the etching speed on the inside wall of the roof-plate 9 is averaged, which can increase the average etching speed over the whole inside wall” through rotating the magnets. Col. 6, lines 58-65. Averaging the etching speed does not “control a radial density distribution of the plasma” as required by Applicant’s claim 34.

Since the magnetic elements in Setoyama are not configured “to control a radial density distribution of the plasma and thereby the dose uniformity of the ions implanted into the workpiece” as required by Applicant’s claim 34, not every limitation of claim 34 has been shown. Furthermore, since the magnetic elements in Setoyama are used for a different purpose than the magnetic elements in Applicant’s claim 34, the elements in Setoyama would not perform the same function in combination as they would separately. Thus, the combination of references cited does not establish a prima facie case of obviousness.

Shan, while not part of the rejection for claim 34, likewise does not disclose the missing limitations of claim 34. Each of the magnetic elements in Shan “enhances the plasma ion density throughout the chamber.” Col. 5, line 22. The examples in Shan show that use of the magnetic elements can increase etch rate. Col. 8, lines 38-49. Shan fails to teach the requirement that the magnetic elements “control a radial density distribution of the plasma and thereby the dose uniformity of the ions implanted into the workpiece.”

Applicant further requests withdrawal of the rejection to claim 34 on another ground. Claim 34 requires “a first plurality of magnetic elements disposed on said adjustable anode and being movable within said plasma doping chamber” (emphasis added). Examiner stated that “Setoyama teaches a plasma processing apparatus wherein a first plurality of magnetic elements 20a (arranged in one or more annular rings (col. 5, lines 1-2)) are disposed on the anode 9 and the anode 9 and magnets 20a are vertically movable in order to change the processing rate (col. 6, lines 22-49).” Regarding previous arguments by Applicant, Examiner stated that “Hirata

teaches a movable anode located within a chamber. Setoyama was simply applied to show that magnet elements can be disposed on an anode.”

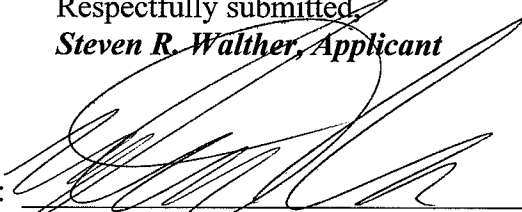
Applicant respectfully asserts that Examiner has failed to show “a first plurality of magnetic elements disposed on said adjustable anode and being movable within said plasma doping chamber” as required by claim 34 (emphasis added). Examiner stated that the magnetic elements of Setoyama are merely “vertically movable in order to change the processing rate.”

Setoyama includes “groups of permanent magnets 20a arranged on the roof-plate 9” that are moved up or down in an area above the roof plate 9 as a group. Col. 5, lines 9-10 and 19-20. “[T]he permanent magnets 20a arranged on the roof-plate 9 to generate the cusped magnetic field used for cleaning with the plasma are reciprocally moved up and down by the swing mechanism 15.” Col. 6, lines 22-25. The swing mechanism is used “to reciprocally move the permanent magnets 20a up and down.” Col. 6, 28-29 (emphasis added). In doing so, the magnets are lifted from the roof-plate (col. 6, lines 35-37) that forms the chamber. Col. 4, lines 62-64. Permanent magnets 20a are, thus, external to the chamber 2 and are not “movable within said plasma doping chamber” as required by Applicant’s claim 34. Thus, because claim 34 requires “a first plurality of magnetic elements disposed on said adjustable anode and being movable within said plasma doping chamber,” Applicant respectfully submits that not every limitation of claim 34 has been shown by Examiner.

Applicant respectfully submits that in light of the foregoing remarks, claim 34 is now in condition for allowance. Claims 35-39 depend from claim 34 and are likewise allowable for at least the foregoing reasons. Reexamination and reconsideration are respectfully requested and early allowance is earnestly solicited. In the event the Examiner deems personal contact desirable in disposition of this application, the Examiner is respectfully requested to call the undersigned agent. Please charge any additional fees or credit any overpayments to deposit account No. 50-0896.

Respectfully submitted,
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